Installation — SFPs
Avaya Secure Router 2330/4134

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Chapter 1: New in this release

This document is being updated to reflect additional SFPs that have been qualified with the Secure Router 2330/4134 for release 10.3.

Other changes

This document is rebranded to Avaya.

Comments? infodev@avaya.com

Chapter 2: Introduction

This document provides information about small form-factor pluggable (SFP) transceiver safety and care, SFP selection, and SFP installation. It also includes SFP specifications.

Navigation

- Safety and equipment care information on page 9
- Small form factor pluggable transceivers on page 21
- SFP specifications on page 29

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Chapter 3: Safety and equipment care information

This section contains important safety and regulatory information. Read this section before you install small form factor pluggable (SFP) transceivers.

Navigation

- Handling, safety, and environmental guidelines on page 9
- Care of fiber optic equipment on page 10
- Product safety warnings and information on page 16

Handling, safety, and environmental guidelines

Before you install an SFP, read the following handling, safety, and environmental guidelines:

- SFPs are static sensitive. For more information about how to prevent damage from electrostatic discharge (ESD), see Electrostatic discharge prevention on page 10.
- Dust contamination can reduce the performance of optical parts in SFPs. When you store an SFP, or after you disconnect it from a fiber optic cable, always keep a dust cover over the optical bore.
- Dispose of this product according to all national laws and regulations.

Electrostatic discharge prevention

To prevent equipment damage, observe the following electrostatic discharge (ESD) precautions when you handle or install the components.

- Ground yourself and the equipment to an earth or building ground. Use a grounded workbench mat (or foam that dissipates static charge) and a grounding wrist strap. The wrist strap must touch the skin and be grounded through a one megaohm resistor.
- Do not touch anyone who is not grounded.
- Leave all components in their ESD-safe packaging until installation, and use only a static-shielding bag for all storage, transport, and handling.
- Clear the area of synthetic materials such as polyester, plastic, vinyl, or styrofoam because these materials carry static electricity that damages the equipment.

Care of fiber optic equipment

You must keep fiber optic equipment connections clean and damage-free. Use the information in this section to properly maintain and care for fiber optic equipment.

Care of fiber optic equipment navigation

- Fiber optic cable care on page 11
- Fiber optic connector care on page 11
- Cleaning single connectors on page 12
- Cleaning duplex connectors on page 13
- Cleaning receptacles on page 15

Fiber optic cable care

Although the glass fiber in fiber optic cable is protected with reinforcing material and plastic insulation, it is subject to damage. Use the following precautions to avoid damaging the glass fiber.

- Do not kink, knot, or vigorously flex the cable.
- Do not bend the cable to less than a 40 mm radius.
- Do not stand on fiber optic cable; keep the cable off the floor.
- Do not pull fiber optic cable harder than you do a cable containing copper wire of comparable size.
- Do not allow a static load of more than a few pounds on a section of the cable.
- Place protective caps on fiber optic connectors that are not in use.
- Store unused fiber optic patch cables in a cabinet, on a cable rack, or flat on a shelf.

Frequent overstressing of fiber optic cable causes progressive degeneration that leads to failure.

If you suspect damage to a fiber optic cable, either due to mishandling or an abnormally high error rate observed in one direction, reverse the cable pairs. If the high error rate appears in the other direction, replace the cable.

Caution:

Risk of equipment damage

Do not crush fiber optic cable. If fiber optic cable is in the same tray or duct with large, heavy electrical cables, it can be damaged by the weight of the electrical cable.

Fiber optic connector care

Before connecting fiber optic connectors to transmission equipment, test equipment, patch panels, or other connectors, ensure fiber optic connectors are clean. The performance of an optical fiber connector depends on how clean the connector and coupling are at the time of connection.

A damaged or dirty connector can damage a connector with which it pairs. A connector must be absolutely clean before you insert it into a transmitter or receiver.

Never clean an optical connector while it carries light. Optical power can cause ignition of the cleaning material when it contacts the end of the optical connector and destroy the connector.

Typical cleaning materials, for example, tissues saturated with alcohol, combust almost instantaneously after you expose them to optical power levels of +15 dBm or higher.

Visually inspect the connector to determine cleanliness and to determine if it needs replacing. You must replace a connector that has a scratch across the core, or a scratch that appears to end in the core.

The proper connector cleaning method depends on the connector contaminants:

- Judge cleanliness by visual inspection with a fiber microscope. First inspect the connector, and then clean as required.

  Warning:
  Risk of eye injury

  When you inspect a connector, ensure that light sources are off. The light source in fiber optic cables can damage your eyes.

- If you suspect only the possibility of dust particles (for example, which can occur when you leave a connector uncapped in a clean environment), use high-quality canned air or a reel cleaner, for example, a Cletop, to clean the connector. A reel cleaner is a good choice to ensure that no dust contaminates the connector.
- If the connector is visibly dirty or you suspect it to be contaminated by chemicals (for example, matching gel), use high-quality alcohol and canned air to clean the connector. This method is the most thorough cleaning method. In some cases, a reel cleaner can suffice.

The more surface manipulation you apply to the connector, the more likely the connector is to become damaged.

When you insert a connector ferrule into a connector or adapter, ensure that the ferrule tip does not touch the outside of the mating connector or adapter. This can produce scratches and dirt deposits on the connector.

To help prevent connectors from collecting dust, cover them when not in use. To avoid the transfer of oil or other contaminants from your fingers to the end face of the ferrule, handle connectors with care. Do not touch the connector end face.

Cleaning single connectors

Clean connectors so that the optical signal is minimally attenuated by the connector.

This procedure is appropriate when you suspect more than dust contamination.

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Prerequisites

- You need a lens-grade, lint-free tissue, or example, Kimwipes.
- You need an optical-grade isopropyl alcohol (IPA) (98% or more pure).
- You need a high-quality canned compressed air with extension tube.

  Compressed air must be free of dust, water, and oil, or filmy deposits or scratches on the surface of the connector can result.
- You need a fiber optic microscope to inspect connectors.

Warning:

Risk of eye injury

When inspecting a connector, ensure that light sources are off. The light source used in fiber optic cables can damage your eyes.

To avoid getting debris in your eyes, wear safety glasses when working with the canned air duster.

To avoid eye irritation on contact, wear safety glasses when working with isopropyl alcohol.

Procedure steps

1. Remove dust or debris by applying canned air to the cylindrical and end-face surfaces of the connector.
2. Gently wipe the cylindrical and end-face surfaces with a tissue dampened with optical-grade isopropyl alcohol.
3. Gently wipe the cylindrical and end-face surfaces with a dry tissue.

   Important:

   Do not let the IPA evaporate; wipe it dry immediately. Alcohols can leave a residue that is difficult to remove.
4. Dry the connector surfaces by applying canned air.
5. Inspect the connector to ensure it is clean and undamaged.

   To prevent contamination, do not touch the connector surfaces after cleaning; and cover connectors with dust caps if you are not going to use them right away.

Cleaning duplex connectors

Clean connectors so that the optical signal is minimally attenuated by the connector.

This procedure is appropriate when you suspect more than dust contamination.

Prerequisites

- You need a lens-grade, lint-free tissue, for example, Kimwipes.
- You need an optical-grade isopropyl alcohol (IPA) (98% or more pure).
- You need a high-quality canned compressed air with extension tube.

  Compressed air must be free of dust, water, and oil, or filmy deposits or scratches on the surface of the connector can result.
- You need a fiber optic microscope to inspect connectors.

Warning:

Risk of eye injury

When you inspect a connector, ensure that light sources are off. The light source in fiber optic cables can damage your eyes.

To avoid getting debris in your eyes, wear safety glasses when you work with the canned air duster.

To avoid eye irritation on contact, wear safety glasses when you work with isopropyl alcohol.

Procedure steps

1. To remove or retract the shroud, do one of the following.
   - On removable shroud connectors, hold the shroud on the top and bottom at the letter designation, apply medium pressure, and then pull it free from the connector body. Do not discard the shroud.
   - On retractable shroud connectors, hold the shroud in its retracted position.
2. Remove dust or debris by applying canned air to the cylindrical and end-face surfaces of the connector.
3. Gently wipe the cylindrical and end-face surfaces of both ferrules using a tissue saturated with optical-grade isopropyl alcohol.
4. Gently wipe the cylindrical and end-face surfaces with a dry tissue.

   Important:

   Do not let the IPA evaporate; wipe it dry immediately. Alcohols can leave a residue that is difficult to remove.
5. Blow dry the connector surfaces with canned air.
6. Inspect the connector to ensure it is clean and undamaged.
7. Using care to not touch the clean ferrules, gently push the shroud back onto the connector until it seats and locks in place.

Cleaning receptacles

Clean connector receptacles or ports so that the optical signal is minimally attenuated by the connection.

Prerequisites

- You need an optical-grade isopropyl alcohol (IPA) (98% or more pure).
- You need cleaning swabs (also called cleaning sticks or wands).
- You need a high-quality canned compressed air with extension tube.

  Compressed air must be free of dust, water, and oil, or filmy deposits or scratches on the surface of the connector can result.

Caution:

Risk of equipment damage

To avoid contamination, optical ports must only be cleaned when there is evidence of contamination or reduced performance, or during their initial installation.

To prevent oil contamination of connectors, use only high-quality canned compressed air.

Do not allow the air extension tube to touch the bottom of the optical port.

Procedure steps

1. Remove dust or debris by blowing canned air into the optical port of the device using the canned air extension tube.
2. Clean the optical port by inserting a wand moistened with alcohol into the receptacle and rotating it.

   Each cleaning wand must only be used to clean one optical port.
3. Dry the optical port by inserting a dry wand into the receptacle and rotating it.

   Important:

   Do not let the IPA evaporate; wipe it dry immediately. Alcohols can leave a residue that is difficult to remove.
4. Remove lint by blowing compressed air into the optical port.
5. Reconnect the optical connector and check for proper function.

   If you are not reinstalling the connector, be sure to use a protective cap.

   If problems persist, ensure that the connector or receptacle is free from damage.

Product safety warnings and information

The products described in this guide meet requirements of:

IEC 60950 3rd edition CSA 22.2 No. 60950 3rd edition UL 60950 3rd edition EN60950 3rd edition EN60825-1, +A11, +A2

ESD and installation caution messages

This section provides electrostatic discharge (ESD) and installation caution messages.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Electrostatic alert:

ATTENTION

Risque d’endommagement de l’équipement

Pour prévenir tout dommage dû à une décharge électrostatique, vous devez toujours porter un un bracelet antistatique connecté à une prise ESD.

Electrostatic alert:

ACHTUNG

Risiko eines Geräteschadens

Risiko eines Geräteschadens Um Schäden durch elektrostatische Entladung zu verhindern, tragen Sie bei der Instandhaltung dieses Produkts immer ein antistatisches Band am Handgelenk, welches mit einer ESD-Buchse verbunden ist.

Electrostatic alert:

PRECAUCIÓN

Riesgo de daño del equipo

Para prevenir el daño producido por una descarga electrostática, use siempre una pulsera antiestática conectada a un enchufe ESD.

Electrostatic alert:

CUIDADO

Risco de danos ao equipamento

Para evitar danos com descarga eletrostática, sempre use uma pulseira antiestática que esteja conectada a uma tomada ESD.

Electrostatic alert:

ATTENZIONE

Rischio di danni all’apparecchiatura

Per evitare danni derivanti da scariche elettrostatiche, indossare sempre un polsino antistatico collegato a una presa ESD.

Caution:

Risk of equipment damage

Only trained personnel can install this product.

Caution:

ATTENTION

Risque d’endommagement de l’équipement

L’installation doit être effectuée exclusivement par un personnel qualifié.

Caution:

ACHTUNG

Risiko eines Geräteschadens

Nur geschultes Personal kann dieses Produkt installieren.

Caution:

PRECAUCIÓN

Riesgo de daño del equipo

Sólo el personal capacitado puede instalar este producto.

Caution:

CUIDADO

Risco de danos ao equipamento

Somente pessoal treinado pode instalar este produto.

Caution:

ATTENZIONE

Rischio di danni all’apparecchiatura

Questo prodotto può essere installato solo da personale esperto.

Laser safety warnings

This section provides laser safety warnings.

Warning:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Warning:

AVERTISSEMENT

Risques de blessure oculaire par lumière laser L’équipement de fibres optiques peut émettre une lumière laser ou infrarouge nuisible à vos yeux. Ne regardez jamais en direction de fibres optiques ou d’un port connecteur. Supposez toujours que les câbles de fibres optiques sont connectés à une source de lumière.

Warning:

WARNUNG

Risiko einer Augenverletzung durch Laser Glasfasergeräte können Laserstrahlen oder ultraviolettes Licht aussenden, das Ihre Augen verletzen kann. Schauen Sie nie direkt in einen Glasfaserleiter oder Verbindungsanschluss. Gehen Sie immer davon aus, dass Glasfaserkabel mit einer Lichtquelle verbunden sind.

Warning:

ADVERTENCIA

Riesgo de lesión en los ojos por láser El equipo de fibra óptica puede emitir una luz láser o infrarroja que dañe sus ojos. Nunca mire un puerto de fibra óptica o conector. Siempre asuma que los cables de fibra óptica están conectados a una fuente de luz.

Warning:

AVISO

O laser pode causar ferimentos no olho O equipamento de fibra ótica pode emitir laser ou luz infravermelha que pode causar danos a sua vista. Nunca olhe para dentro da fibra ótica ou da porta do conector. Tenha sempre em mente que os cabos de fibra ótica estão ligados a uma fonte de luz.

Warning:

AVVISO

Rischio di ustioni agli occhi dovute al laser Le apparecchiature con fibre ottiche possono emettere raggi laser o infrarossi in grado di provocare ferite agli occhi. Non guardare mai all’interno di una porta di connessione o una fibra ottica. Tenere sempre presente che i cavi a fibra ottica sono collegati a una sorgente luminosa.

Comments? infodev@avaya.com

Chapter 4: Small form factor pluggable transceivers

This section describes how to select and install small form factor pluggable (SFP) transceivers.

Use an SFP to connect a device motherboard to a fiber optic or unshielded twisted pair network cable. The SFPs described in this section provide Ethernet at 1 gigabit per second (Gb/s).

Note:

SFPs are supported on the chassis ports as well as the 10–port GigE Medium Module. However, SFPs installed on the Secure Router 4134 chassis ports are not capable of 1Gb/s throughput. If 1Gb/s throughput is required, install the SFP on the Medium Module SFP slot

The Secure Router 2330 chassis SFP ports are capable of 1Gb/s throughput.

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- Selecting an SFP on page 23
- Installing an SFP on page 24
- Removing an SFP on page 27

Avaya SFPs qualified with Secure Router 2330/4134

You can use a Digital Diagnostic Indicating (DDI) SFP in an Avaya Secure Router 2330/4134 module that supports SFPs. The router supports the optical functions of the SFP. A future release will provide access to the DDI information.

The following table lists and describes the Avaya SFP models with DDI capability. All of these SFPs use LC connectors.

Table 1: SFPs with DDI capability

Model	Part number	Internal part number	Description
1000BASE-BX10	AA1419069-E6 and AA1419070-E6;	323243-B and 323244-B	One model transmits at 1310 nm and receives at 1490 nm, while the mating model transmits at 1490 nm and receives at 1310 nm. You can only connect a mating pair, up to 10 km
1000BASE-BX40	AA1419076-E6 and AA1419077-E6	—	One model transmits at 1310 nm and receives at 1490 nm, while the mating model transmits at 1490 nm and receives at 1310 nm. You can only connect a mating pair, up to 40 km
1000BASE-LX	AA1419049-E6	318247-B	1310 nm, up to 10 km
1000BASE-SX	AA1419048-E6	318245-B	850 nm, up to 275 or 550 m
1000BASE-XD	AA1419050-E6	318636-B	1310 nm, up to 40 km.
1000BASE-XD	AA1419051-E6 CWDM: AA1419053-E6 to AA1419060-E6	318249-B CWDM: 318253-B to 318267-B	1550 nm, up to 40 km
1000BASE-ZX	AA1419052-E6 CWDM: AA1419061-E6 to AA1419068-E6	318251-B CWDM: 318269-B to 318283-B	1550 nm, up to 70 km
1000BASE-EX	AA1419071-E6	323180-B	1550 nm, up to 120 km

For more information about specifications for these SFPs, see SFP specifications on page 29.

The following table lists and describes the Avaya SFP models that do not have DDI capability.

Table 2: SFPs without DDI capability

Model	Part number	Internal part number	Description
1000BASE-LX	AA1419015-E5	N0101538	1310 nm • Up to 550 meters (m) using MMF • Up to 10 kilometers (km) using SMF
1000BASE-SX (LC)	AA1419013-E5	N0101534	850 nm • up to 275 m using 62.5 µm MMF optic cable • up to 550 m using 50 µm MMF optic cable
1000BASE-SX (MT-RJ)	AA1419014-E5	N0101537	850 nm • up to 275 m using 62.5 µm MMF optic cable • up to 550 m using 50 µm MMF optic cable
1000BASE-XD CWDM	AA1419025-E5 to AA1419032-E5	AA1419025-E5: N0101539 AA1419026-E5 to AA1419032-E5: N0101541 to N0101547	up to 40 km
1000BASE-ZX CWDM	AA1419033-E5 to AA1419040-E5	N0101548 to N0101557 AA1419040-E5: N0107872	up to 70 km

For more information about specifications for these SFPs, see SFP specifications on page 29.

Selecting an SFP

Use an SFP transceiver to connect a device motherboard to a fiber optic or unshielded twisted pair network cable. Select the appropriate transceiver to provide the required reach.

Procedure steps

1. Determine the required reach.

Depending on the product, SFPs are available for cable distances of up to 100 meters (m), 550 m, 10 kilometers (km), 40 km, 70 km, and 120 km.

2. Determine the required media and connector type.

   You need fiber optic cable for a reach over 100 m.

   Possible media include CAT5, single mode fiber, and multimode fiber. Possible connectors include Lucent connector (LC), MT-RJ, and RJ-45.

3. If the media is optical fiber, determine wavelength restrictions or requirements.

   To expand available bandwidth on a common optical fiber, use Coarse Wavelength Division Multiplexing (CWDM) SFPs.

4. Determine if you need digital diagnostic monitoring (DDM).

   Not all SFPs or products support DDM.

5. Use the following job aids to determine the appropriate SFP for your application.

Job aid

The following table describes the reach provided by various SFPs. This table is informational only—not all Avaya Ethernet switching and routing products support all the SFPs listed here.

The Avaya Secure Router 2330/4134 supports the 1000BASE-SX (AA1419048-E6) and the 1000BASE-LX (AA1419049-E6) SFPs.

SFP model	Common application
1000BASE-T	Lowest-cost gigabit Ethernet solution. Up to 100 m reach over Category 5 (CAT5) unshielded twisted pair (UTP).
1000BASE-SX	Well-suited for campus local area networks (LAN) and intrabuilding links. Up to 275 or 550 m reach (fiber-dependent) over a fiber pair.
1000BASE-LX	Up to 10 km reach over a single mode fiber (SMF) pair. Up to 550 m reach over a multimode fiber (MMF) pair.
1000BASE-XD	Up to 40 km reach over a single mode fiber pair.
1000BASE-ZX	Up to 70 km reach over a single mode fiber pair.
1000BASE-BX	Up to 10 km reach. Bidirectional over one single mode fiber.
1000BASE-EX	Up to 120 km reach over a single mode fiber pair.

Installing an SFP

Install an SFP to provide an interface between the switch and the network cable.

Installing an SFP takes about three minutes.

The Avaya Secure Router 2330/4134 supports the 1000BASE-SX (part number AA1419048-E6; internal part number 318245-B) and the 1000BASE-LX (part number AA1419049-E6; internal part number 318247-B) SFPs.

For translations of the following messages, see Product safety warnings and information on page 16.

Prerequisites

- Verify that the SFP is the correct model for your network configuration.
- Before you install the optical connector, ensure it is clean.

Warning:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Caution:

Risk of equipment damage

Only trained personnel can install this product.

Procedure steps

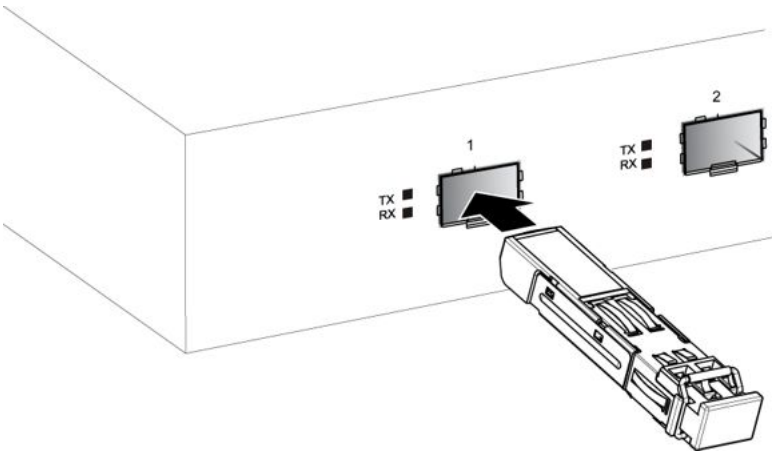
1. Remove the SFP from its protective packaging.
2. Grasp the SFP between your thumb and forefinger.
3. As shown in the following figure, insert the device into the slot on the module.

   Caution:

   Risk of equipment damage

   SFPs are keyed to prevent incorrect insertion. If the SFP resists pressure, do not force it; turn it over, and reinsert it.

   Apply a light pressure to the device until it clicks and locks into position.

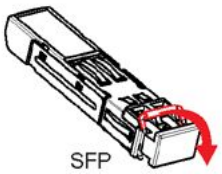


4. Remove the dust cover from the optical bore and insert the fiber optic connector.

Job aid

Depending on the transceiver manufacturer, your SFP transceiver can have various types of locking and extractor mechanisms.

The following figure shows a typical mechanism used on SFP transceivers; other locking and extractor mechanisms exist, although they are not shown here. In the following figure, the SFP still has the bore plug installed. Pull the bail to release the device.



The following figure shows the wrap-around latch-type extraction mechanism. To remove the device, push the collar towards the module.

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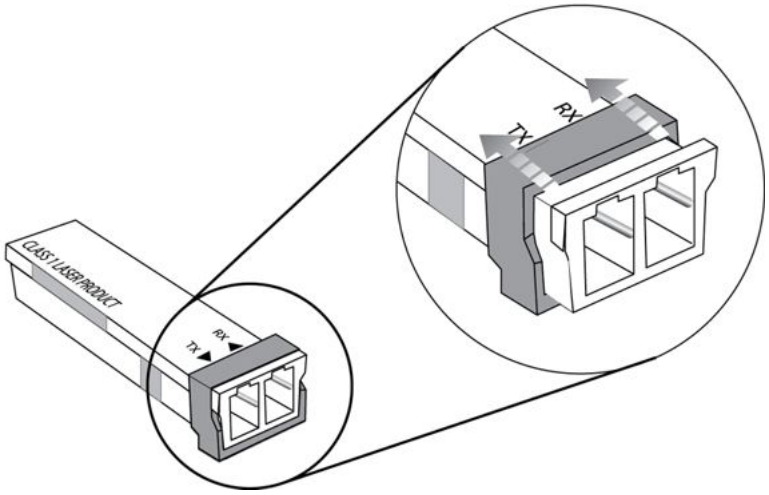

Removing an SFP

Remove an SFP to replace it or to commission it elsewhere.

For translations of the following messages, see Product safety warnings and information on page 16.

Prerequisites

Wear an antistatic wrist strap.

Warning:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Procedure steps

1. Disconnect the network fiber optic cable from the SFP connector.
2. Affix dust covers over the fiber optic bore and connector.
3. Depending on your SFP model, to release the SFP, press the locking and extractor mechanism.
4. Slide the SFP out of the module SFP slot.

If the SFP does not slide easily from the module slot, use a gentle side-to-side rocking motion while firmly pulling the SFP from the slot.

5. Store the SFP in a safe place until needed.

Important:

If you discard the SFP, be sure to dispose of it according to all national laws and regulations.

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Chapter 5: SFP specifications

This section provides technical specifications for the supported small form factor pluggable (SFP) models. Use this information to aid in proper network design.

The specifications in this section meet or exceed those specified in the applicable IEEE standards, where they exist.

In these specifications, unless otherwise noted, receiver sensitivity is the minimum average input optical power for which the receiver is guaranteed to meet the bit error rate (BER) of 10^{-12}.

Navigation

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SFP labels

The Avaya label on a typical SFP contains an Avaya serial number, a bar code, a manufacturer code, an interface type, and a part number.

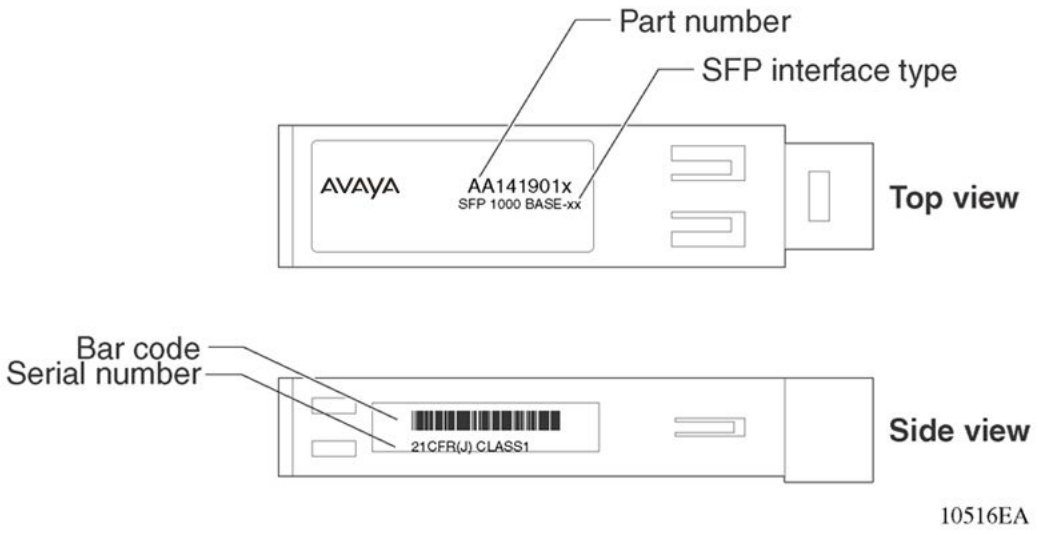

Figure 1: SFP label

General SFP specifications

The following table describes general SFP specifications.

Table 3: General SFP specifications

Parameter	Description
Dimensions (H x W x D)	13.4 x 8.50 x 56.4 millimeters (mm) 0.53 x 0.33 x 2.22 inches (in.) unless otherwise stated
Operating temperature	– 5 to 85C for RoHS -E6 models 0 to 60C for RoHS -E5 models
Storage temperature	– 40 to 85C
Maximum supply current	300 mA unless otherwise stated
Maximum power consumption	1.0 W unless otherwise stated

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1000BASE-BX10 DDI SFP specifications

The 1000BASE-BX bidirectional SFPs (part numbers AA1419069-E6 and AA1419070-E6; internal part numbers 323243-B and 323244-B) provide gigabit Ethernet connectivity over a single fiber.

The following figure shows an example of a 1000BASE-BX10 SFP pair. The appearance of the connector can vary in shape and latch color.

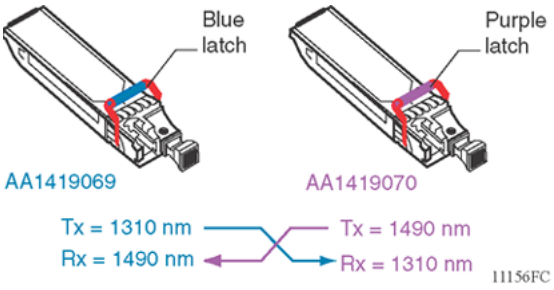

Figure 2: 1000BASE-BX

As shown in the previous figure, the transmit (Tx) and receive (Rx) paths share the same fiber by using two different wavelengths. One model transmits at 1310 nm and receives at 1490 nm, while the mating model transmits at 1490 nm and receives at 1310 nm. You can only connect a mating pair.

You can use 1000BASE-BX SFPs to double the number of your fiber links. For example, if you install 20 fiber pairs with 20 conventional ports connected, you can use 1000BASE-BX SFPs to expand to 40 ports, using the same fiber.

The long wavelength optical transceivers used in these models provide variable distance ranges using single mode fiber optic cabling.

The following table describes standards, connectors, cabling, and distances for the 1000BASE-BX SFP.

Table 4: IEEE 802.3ah 1000BASE-BX10 SFP specifications

Parameter	Specifications
Connectors	Single-fiber LC
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Distance	Up to 10 km
Wavelength	1310 nm and 1490 nm
Link optical power budget	11.0 dB

Parameter	Specifications
Maximum transmitter and dispersion power penalty	3.3 dB
Transmitter Characteristics	
Maximum launch power	– 3.0 dBm
Minimum launch power	– 9.0 dBm
Receiver characteristics	
Maximum receiver sensitivity	– 19.5 dBm
Maximum input power (maximum average receive power)	– 3.0 dBm

1000BASE-BX40 DDI SFP specifications

The 1000BASE-BX40 bidirectional SFPs (part numbers AA1419076-E6 and AA1419077-E6) provide gigabit Ethernet connectivity over a single fiber.

The transmit and receive paths share the same fiber by using two different wavelengths. One model transmits at 1310 nm and receives at 1490 nm, while the mating model transmits at 1490 nm and receives at 1310 nm. You can only connect a mating pair.

You can use 1000BASE-BX SFPs to double the number of your fiber links. For example, if you have 20 installed fiber pairs with 20 conventional ports connected, you can use 1000BASE-BX SFPs to expand to 40 ports, using the same fiber.

The long wavelength optical transceivers used in these models provide variable distance ranges using single mode fiber optic cabling.

The 1000BASE-BX SFPs (part numbers AA1419076-E6 and AA1419077-E6) can attain a reach of up to 40 km.

The following table describes standards, connectors, cabling, and distances for the 1000BASE-BX SFP.

Caution:

Risk of equipment damage

Connect 1000BASE-BX SFP AA1419076-E6 to 1000BASE-BX SFP AA1419077-E6 using a single mode fiber with at least 6 dB of attenuation. Damage can result if insufficient attenuation is provided or if the same 1000-BASE-BX40 SFPs are connected.

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Table 5: IEEE 802.3ah 1000BASE-BX40 SFP specifications

Parameter	Specifications
Connectors	Single-fiber LC
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Distance	Up to 40 km with SMF
Wavelength	1310 nm and 1490 nm
Link optical power budget	20.0 dB
Maximum transmitter and dispersion power penalty	3.3 dB
Transmitter characteristics	
Maximum launch power	3.0 dBm
Minimum launch power	– 3.0 dBm
Receiver characteristics	
Maximum receiver sensitivity	– 23 dBm
Maximum input power (maximum average receive power)	– 3.0 dBm

1000BASE-EX DDI SFP specifications

The following table describes the 1000BASE-EX DDI SFP. This SFP operates at 1550 nm and has a reach of up to 120 km. The part number of this SFP is AA1419071-E6 (internal part number 323180-B).

Caution:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 14 dB of attenuation is present between the transmit and receive ports.

To attain the BER of 10^{-12}, the minimum attenuation between the transmit and receive ports is 15 dB.

Table 6: 1000BASE-EX DDI SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.2 W

Parameter	Specifications
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	30dB
Maximum dispersion power penalty	2.0 dB at 120 km
Transmitter characteristics	
Launch power	0 to 5.0 dBm
Receiver characteristics	
Receiver sensitivity	– 30 dBm
Maximum receiver power	– 9.0 dBm

1000BASE-LX DDI SFP specifications

This SFP provides 1000BASE-LX gigabit Ethernet connectivity at 1310 nanometers (nm) using single mode or multimode optical fiber. The part number of this SFP is AA1419049-E6 (internal part number 318247-B).

Table 7: 1000BASE-LX DDI SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 watt (W)
Connectors	Duplex LC
Cabling	50 micrometer (µm) multimode fiber (MMF) 62.5 µm multimode fiber 9 µm single mode fiber (SMF)
Distance	Up to 550 meters (m) using MMF Up to 10 kilometers (km) using SMF
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	9.5 dB
Transmitter characteristics	
Launch power	– 9.5 to -3.0 dBm
Receiver characteristics	

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Parameter	Specifications
Receiver sensitivity	– 19.0 dBm
Maximum receiver power	– 3.0 dBm

1000BASE-LX SFP specifications

The 1000BASE-LX SFP provides 1000BASE-LX gigabit Ethernet connectivity at 1310 nanometers (nm) using single mode or multimode optical fiber. The 1000BASE-LX SFP supports full-duplex operation only. The part number for this model is AA1419015-E5.

The following table describes standards, connectors, cabling, and distance for the 1000BASE-LX SFP.

Table 8: IEEE 802.3z 1000BASE-LX SFP specifications

Parameter	Specifications
Connectors	Duplex LC
Cabling	• 50 micrometer (µm) multimode fiber (MMF) • 62.5 µm multimode fiber • 9 µm single mode fiber (SMF)
Distance	• Up to 550 meters (m) using MMF • Up to 10 kilometers (km) using SMF
Wavelength	1310 nm
Link optical power budget	10.5 dB
Transmitter characteristics	
Launch power	– 9.5 to – 3.0 dBm
Receiver characteristics	
Receiver sensitivity	– 20 dBm
Maximum input power	– 3.0 dBm

1000BASE-SX DDI SFP specifications

The following table describes the 1000BASE-SX DDI SFP, which has a reach of up to 550 m using 50 µm MMF, and of 275 m using 62.5 µm MMF. This SFP operates at 850 nm. The part number of this SFP is AA1419048-E6 (internal part number 318245-B).

Table 9: 1000BASE-SX SFP DDI (550 m) specifications

Parameter	Specifications
Maximum electrical power consumption	1 watt (W)
Connector	Duplex LC
Cabling	MMF
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	7.5 dB
Transmitter characteristics	
Launch power	– 9.5 to -4.0 dBm
Receiver characteristics	
Receiver sensitivity	– 17 dBm
Maximum receiver power	0 dBm

1000BASE-SX (LC) SFP specifications

The 1000BASE-SX SFP provides 1000BASE-SX gigabit Ethernet connectivity at 850 nm using multimode optical fiber. This SFP supports full-duplex operation only. The part number for this model is AA1419013-E5.

The following table describes standards, connectors, cabling, and distance for the 1000BASE-SX SFP.

Table 10: IEEE 802.3z 1000BASE-SX (LC) SFP specifications

Parameter	Specifications
Connectors	Duplex LC

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Parameter	Specifications
Cabling	• 62.5 µm MMF optic cable • 50 µm MMF optic cable
Distance	• up to 275 m using 62.5 µm MMF optic cable • up to 550 m using 50 µm MMF optic cable
Wavelength	850 nanometers (nm)
Link optical power budget	7.0 deciBels (dB)
Transmitter characteristics	
Launch power	-10 to -4.0 deciBels referenced to 1 milliwatt (dBm)
Receiver characteristics	
Receiver sensitivity	-17 dBm
Maximum input power	0 dBm

1000BASE-SX (MT-RJ) SFP specifications

The 1000BASE-SX (MT-RJ type) SFP provides gigabit Ethernet connectivity using MT-RJ multimode fiber connectors. The following table describes standards, connectors, cabling, and distance for the 1000BASE-SX (MT-RJ type) SFP. The part number for this model is AA1419014-E5.

Table 11: IEEE 802.3z 1000BASE-SX (MT-RJ) SFP specifications

Parameter	Specifications
Connectors	Duplex MT-RJ
Cabling	• 62.5 µm MMF optic cable • 50 µm MMF optic cable
Distance	• up to 275 m using 62.5 µm MMF optic cable • up to 550 m using 50 µm MMF optic cable
Wavelength	850 nm
Link optical power budget	7.0 dB
Transmitter characteristics	
Launch power	– 10 to – 4.0 dBm

Parameter	Specifications
Receiver characteristics	
Receiver sensitivity	– 17 dBm
Maximum input power	0 dBm

1000BASE-T SFP specifications

The 1000BASE-T SFP provides gigabit Ethernet connectivity using a single eight-pin RJ-45 connector. The 1000BASE-T is a tri-speed copper SFP that can operate at 1 gigabit per second (1 Gb/s), 100 megabits per second (100 Mb/s), or 10 Mb/s.

This SFP supports autosensing of port speed and autonegotiation of duplex mode. However, you can also set a fixed speed at 10 or 100 Mb/s and duplex mode to half or full.

The part number for this model is AA1419043-E6 (internal part number 323242-B).

Important:

Avaya recommends setting all 1000BaseT ports to auto-negotiate in accordance with the IEEE 802.3ab standard. By default, SFPs inserted into certain product-specific modules are set for autonegotiation = True.

The maximum current requirement of the SFP is 375 milliamperes (mA) at 5 volts (V).

The following table describes the 1000BASE-T SFP specifications.

Table 12: IEEE 802.3z 1000BASE-T SFP specifications

Parameter	Specifications
Standards	IEEE 802.3z, IEEE 802.3ab
Connectors	RJ-45
Cabling	CAT5E or better UTP
Distance	Up to 100 m

1000BASE-XD DDI 1310 nm SFP specifications

The following table describes the 1000BASE-XD DDI SFP. This SFP operates at 1310 nm and has a reach of up to 40 km. The part number is AA1419050-E6 (internal part number 318636-B).

Table 13: 1000BASE-XD DDI 1310 nm SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B) code	1.25 Gb/s
Link optical power budget	18 dB
Transmitter characteristics	
Launch power	– 4.5 to 0 dBm
Receiver characteristics	
Receiver sensitivity	– 22.5 dBm
Maximum receiver power	0 dBm

1000BASE-XD DDI 1550 nm SFP specifications

The following table describes the 1000BASE-XD DDI SFP. This SFP operates at 1550 nm and has a reach of up to 40 km. The part number is AA1419051-E6 (internal part number 318249-B).

Caution:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 3 dB of attenuation is present between the transmit and receive ports.

Table 14: 1000BASE-XD DDI 1550 nm SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B) code	1.25 Gb/s
Link optical power budget	22 dB

Parameter	Specifications
Transmitter Characteristics	
Launch power	– 2 to 3. 0 dBm
Receiver Characteristics	
Receiver sensitivity	– 24 dBm
Maximum receiver power	0 dBm

1000BASE-XD DDI CWDM SFP specifications

The following table describes specifications for 1000BASE-XD DDI CWDM SFPs numbered AA1419053-E6 to AA1419060-E6 (internal part numbers 318253-B to 318267-B).

Caution:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 4 dB of attenuation is present between the transmit and receive ports.

Table 15: 1000BASE-XD CWDM SFP DDI (40 km) specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	17 dB
Maximum dispersion power penalty	1 dB at 40 km
Transmitter characteristics	
Launch power	– 4.0 to 1.0 dBm
Receiver characteristics	
Receiver sensitivity	– 21 dBm
Maximum receiver power	– 3.0 dBm

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1000BASE-XD CWDM SFP specifications

The 1000BASE-XD SFPs provides CWDM gigabit Ethernet connectivity using single mode fiber. These SFPs support full-duplex operation only. The part numbers of the 40 km models range from AA1419025-E5 to AA1419032-E5.

Important:

For the 40 km CWDM SFPs, a minimum attenuation of 4 dB must be present between the transmitter and receiver. To avoid receiver saturation, you must insert a minimum attenuation of 4 dB when you test the CWDM SFP in loopback mode, or use short runs of fiber with no intermediate CWDM OADM or CWDM OMUX.

Table 16: 1000BASE-XD CWDM (40 km) SFP specifications

Parameter	Specifications
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Operating temperature range	0 to 60C
Link optical power budget	17 dB
Transmitter characteristics	
Launch power	– 4.0 to 1.0 dBm
Receiver characteristics	
Receiver sensitivity	– 21 dBm
Maximum input power	– 3.0 dBm

1000BASE-ZX DDI SFP specifications

The following table describes the 1000BASE-ZX DDI SFP. This SFP operates at 1550 nm and has a reach of up to 70 km. The part number is AA1419052-E6 (internal part number 318251-B).

Caution:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 5 dB of attenuation is present between the transmit and receive ports.

Table 17: 1000BASE-ZX DDI 1550 nm SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	24 dB
Maximum dispersion power penalty	2 dB at 70 km
Transmitter characteristics	
Launch power	0 to 5 dBm
Receiver characteristics	
Receiver sensitivity	– 24 dBm
Maximum receiver power	– 0 dBm

1000BASE-ZX DDI CWDM SFP specifications

The following table describes specifications for CWDM SFPs numbered AA1419061-E6 to AA1419068-E6 (internal part numbers 318269-B to 318283-B).

Caution:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 8 dB of attenuation is present between the transmit and receive ports.

Table 18: 1000BASE-ZX CWDM SFP DDI (70 km) specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s

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Parameter	Specifications
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	24 dB
Maximum dispersion power penalty	2 dB at 70 km
Transmitter characteristics	
Launch power	0 to 5.0 dBm
Receiver characteristics	
Receiver sensitivity	– 24 dBm
Maximum receiver power	– 3.0 dBm

1000BASE-ZX CWDM SFP specifications

The 1000BASE-ZX SFPs provides CWDM gigabit Ethernet connectivity using single mode fiber. These SFPs support full-duplex operation only. The part numbers of the 70 km models range from AA1419033-E5 to AA1419040-E5.

Important:

For the 70 km CWDM SFPs, a minimum attenuation of 10 dB must be present between the transmitter and receiver.

Table 19: 1000BASE-ZX CWDM (70 km) SFP specifications

Parameter	Specifications
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Operating temperature range	0 to 60C
Link optical power budget	20 dB
Transmitter characteristics	
Launch power	– 3.0 to 2.0 dBm
Receiver characteristics	
Receiver sensitivity	– 23 dBm
Maximum input power	– 3.0 dBm

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